LLO aLOG

(16591-16994)

L1 ISC Link

denis.martynov@LIGO.ORG - posted 00:35, Friday 16 January 2015 - last comment - 18:04, Monday 02 February 2015(16421)

including AA, AI and loop delay in DARM calibration

Joe, Den

Today we worked on including loop delay, AA and AI filters into DARM calibration:

DARM = Plant * AI * Delay_ctrl * CONTROL + 1 / DARM_OPTICAL_TF * 1 / AA * 1 / Delay_error * ERROR

where Delay_ctrl -- delay from LSC (LSC -> SUS -> IOP -> DAC -> analog) to analog actuation and Delay_error -- delay from analog sensing to LSC (analog -> ADC -> IOP -> OMC -> LSC), AA and AI are combined analog and digital anti-aliasing and anti-imaging filters, CONTROL and ERROR are output and input of the DARM servo in the LSC model

Online OAF calibration for DARM corresponds to real time DARM displacement delayed by Delay_error (~150usec) and low-passed by AA filter:

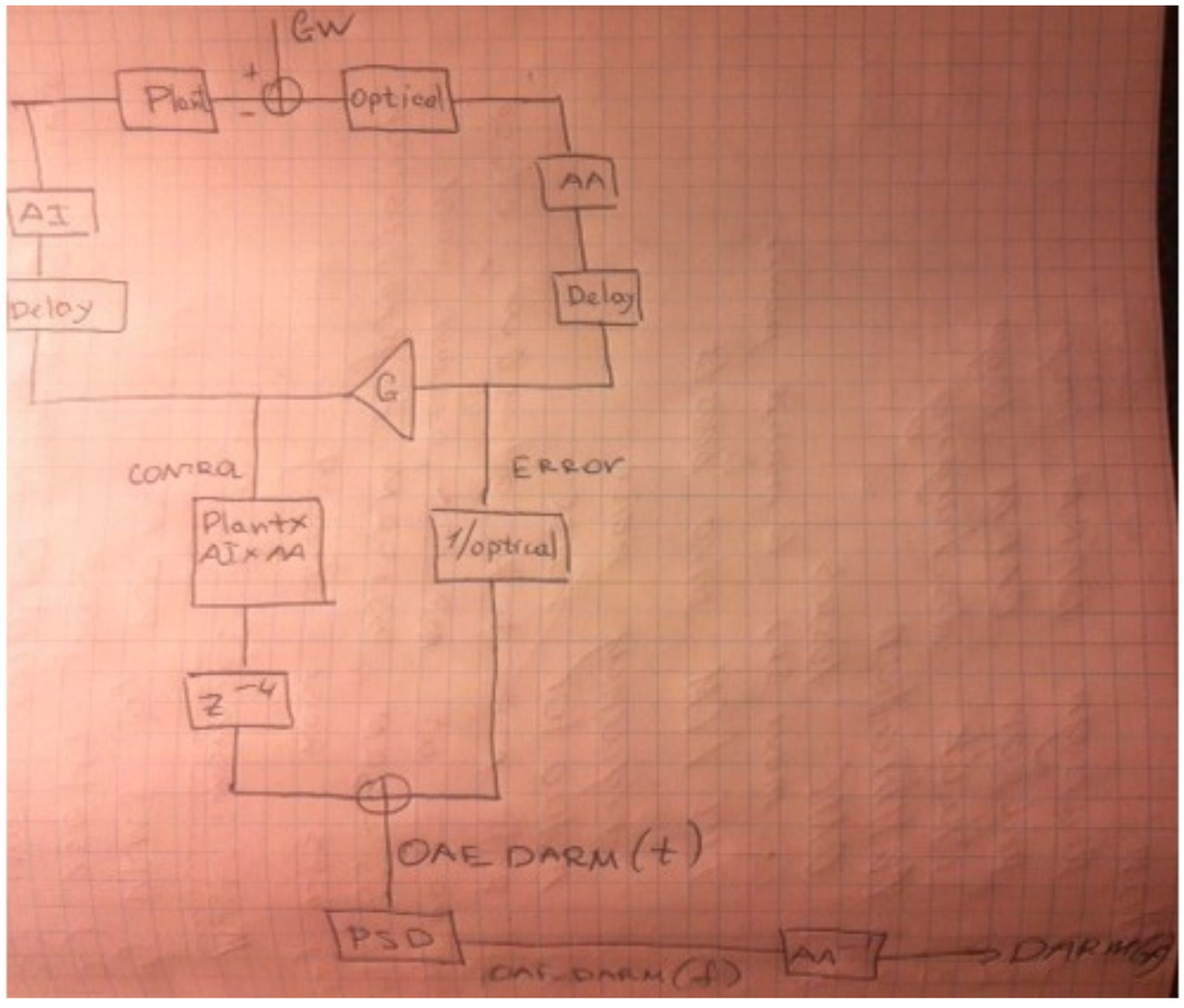
OAF_DARM = Delay_error * AA * DARM = Plant * AI * AA * Delay_loop * CONTROL + 1 / OPTICAL * ERROR

where Delay_loop = Delay_error + Delay_ctrl = ~230 usec.

AA filter will be compensated out from OAF_DARM in the frequency domain. We plan to set up buffer in the OAF model for Delay_loop (4 cycles) before summing point with filtered error. We added AI and AA filters to OAF calibration model.

https://alog.ligo-la.caltech.edu/aLOG/index.php?callRep=16421

詳細は把握できていませんが、calibrationの報告がありましたので。



L1 ISC (TCS) Link

nicolas.smith@LIGO.ORG - posted 02:21, Tuesday 03 February 2015 - last comment - 12:45, Wednesday 04 February 2015(16644)

ETM ring heater electrostatic coupling projection to DARM

(nic anamaria valera)

To follow-up the previous measurement of the coupling of the total ring heater potential to DARM, we measured the voltage noise on the output of the ring heater drivers for both ETMs.

The ETM TCS ring heater drivers are known to couple lines near 75Hz to DARM which originate from the cooling fan in the driver chassis. Over the last week, we have gravitated toward the following coupling mechanism for the noise: the fan sits on the +-18V supply, and pulls the ground potential of the driver chassis around. This is then driven in *common mode* onto the pins accross the ring heater, causing the potential of the ring heater to be modulated. This then couples electrostatically to the test mass. This theory is supported by the previous measurement due to both the frequency dependence (1/f^2) and the fact that Valera and Den caused the coupling to DARM by driving only one pin of the ring heater.

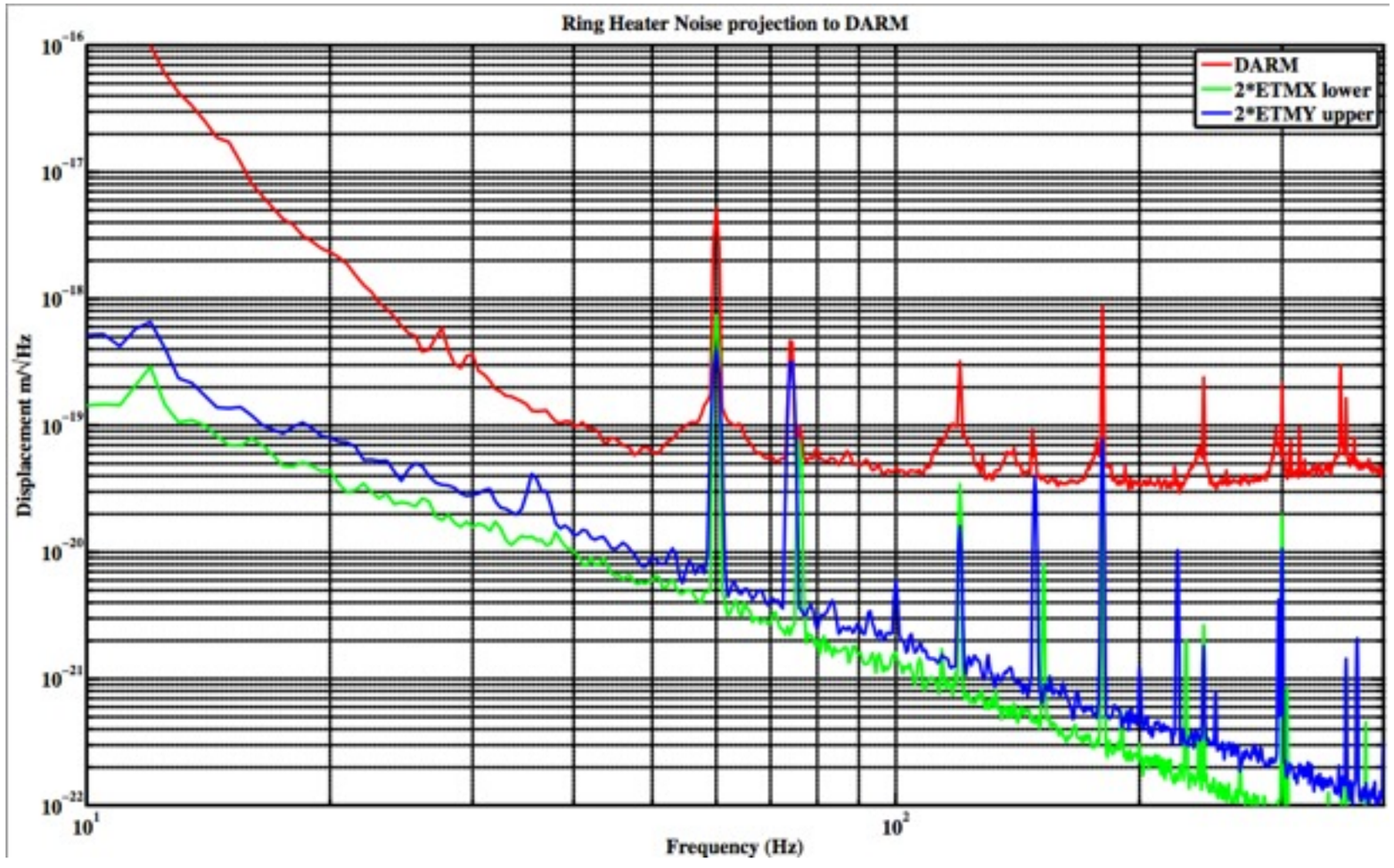
The first and second attachments show the noise of both ETM ring heater drivers, for both common mode (+ output versus rack ground) and differential mode (+ output versus - output). One can see that the noise in the differential mode (which is being controlled by the driver) has almost no features. (This is not true for ETMX upper ring heater, which has a grounding problem, to be mentioned below). In the common mode, the 60Hz harmonics are large, as well as harmonics of the ~75Hz cooling fans.

We combined these measurements with the coupling measurements in order to make a projection to DARM. We have incomplete data, we only have good coupling measurements for half of each ring heater, so the results are multiplied by 2 (assuming the noise is coherent for a given driver). This is the last attachment. One can see that the ~75Hz lines are well accounted for, and the broad-band noise is less than a factor of 10 from the noise floor of DARM.

https://alog.ligo-la.caltech.edu/aLOG/index.php?callRep=16644

前回報告しましたETMのring heaterに関するノイズprojectionの報告。

x,yのtest massにおける60Hz付近75Hz付近のラインノイズのDARMへの影響



L1 ISC Link

denis.martynov@LIGO.ORG - posted 23:50, Tuesday 03 February 2015 - last comment - 23:50, Saturday 07 February 2015(16672)

noise budget

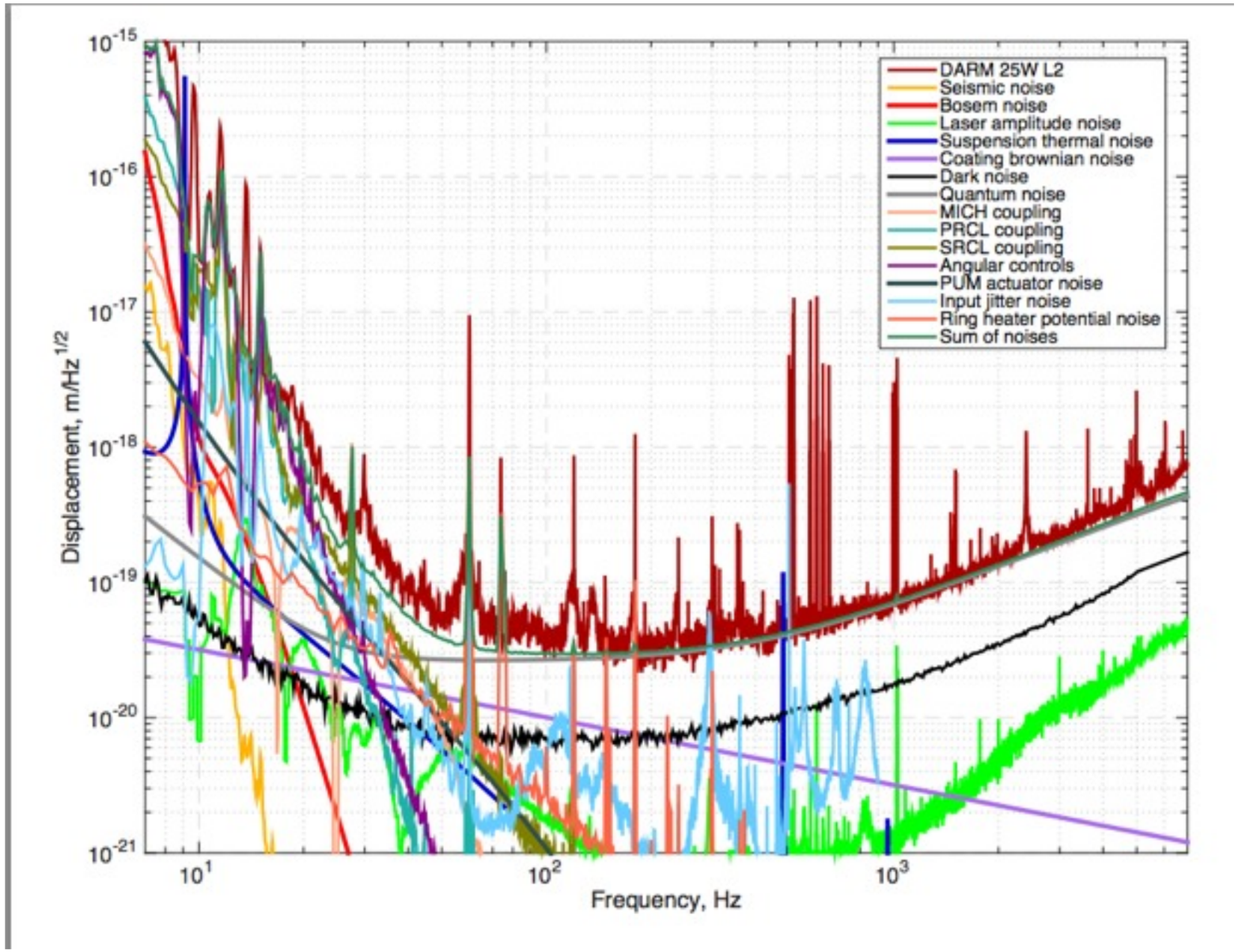
This alog describes an update on DARM noise budget with input PSL power of 25W and input interferometer power of 23W. BNS range computed for the sensitivity is 60Mpc.

There is gap of factor of ~2 between sum of known noises and measured DARM noise in the frequency range 20-50Hz. Compared to the previous noise budget (alog 16475) we have improved DRMI noise coupling to DARM by increasing the input power. We have also switched BS M2 actuator to low-noise state 3. However, DARM noise did not follow the sum of DRMI and actuator noises in this frequency band. One interesting fact we noted during the measurement of coupling of DRMI signals to DARM is broad violin resonance of BS. We saw the same effect with quads (alog 15966).

At frequencies higher than 100Hz the main unknown noise is around the power lines. During last week we have investigated that 140Hz peak can be reduced and shifter in frequency by moving YARM axis in yaw. Height of bumps around power lines in non-stationary too and can vary by factor of 2-3 from day to day.

https://alog.ligo-la.caltech.edu/aLOG/index.php?callRep=16672

これも前回報告したnoise budgetの最新version
DRMI(Dual Recycled Michelson Interferometer)のcoupling noiseが与えていた影響が改善。
100Hz以上のずれもpower関連だろう



General Link

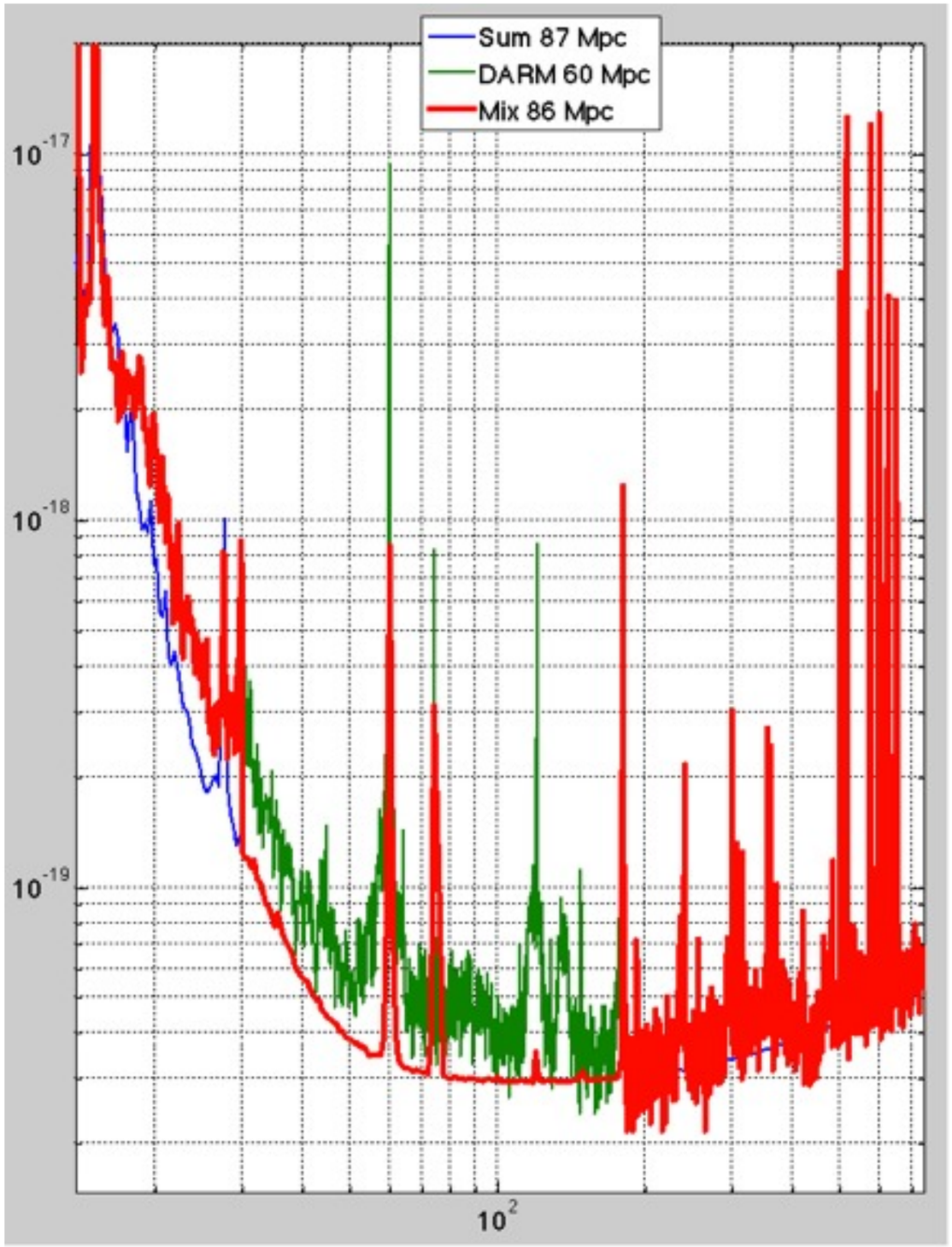
matthew.evans@LIGO.ORG - posted 23:58, Saturday 07 February 2015 (16726)

Noise Budget Musing

For the record, if I compute the range for the "Sum of Noises" curve in the latest noise budget I get 87 Mpc. If I use the measured noise everywhere except 30-180Hz, where I use the Sum curve, I get 86 Mpc. If I go only to 120Hz, I get 83 Mpc. Using the real DARM data gives 60Mpc.

https://alog.ligo-la.caltech.edu/aLOG/index.php?callRep=16726

Noise budgetできたノイズのみでrangeを計算すると87Mpcまで見える。



L1 CAL (CAL, Detchar) Link

alan.weinstein@LIGO.ORG - posted 13:58, Wednesday 04 February 2015 (16680)

UPDATE to comparison of the strain ASD and range between L1:OAF-CAL_DARM_DQ and L1:GDS-CALIB_STRAIN

Maddie has made progress in improving the filtering used in gstlal_compute_strain to produce L1:GDS-CALIB_STRAIN (in the L1_ER_C00_AGG frames) to reproduce what is in the (dewhitened) L1:OAF-CAL_DARM_DQ (in the L1_R frames).

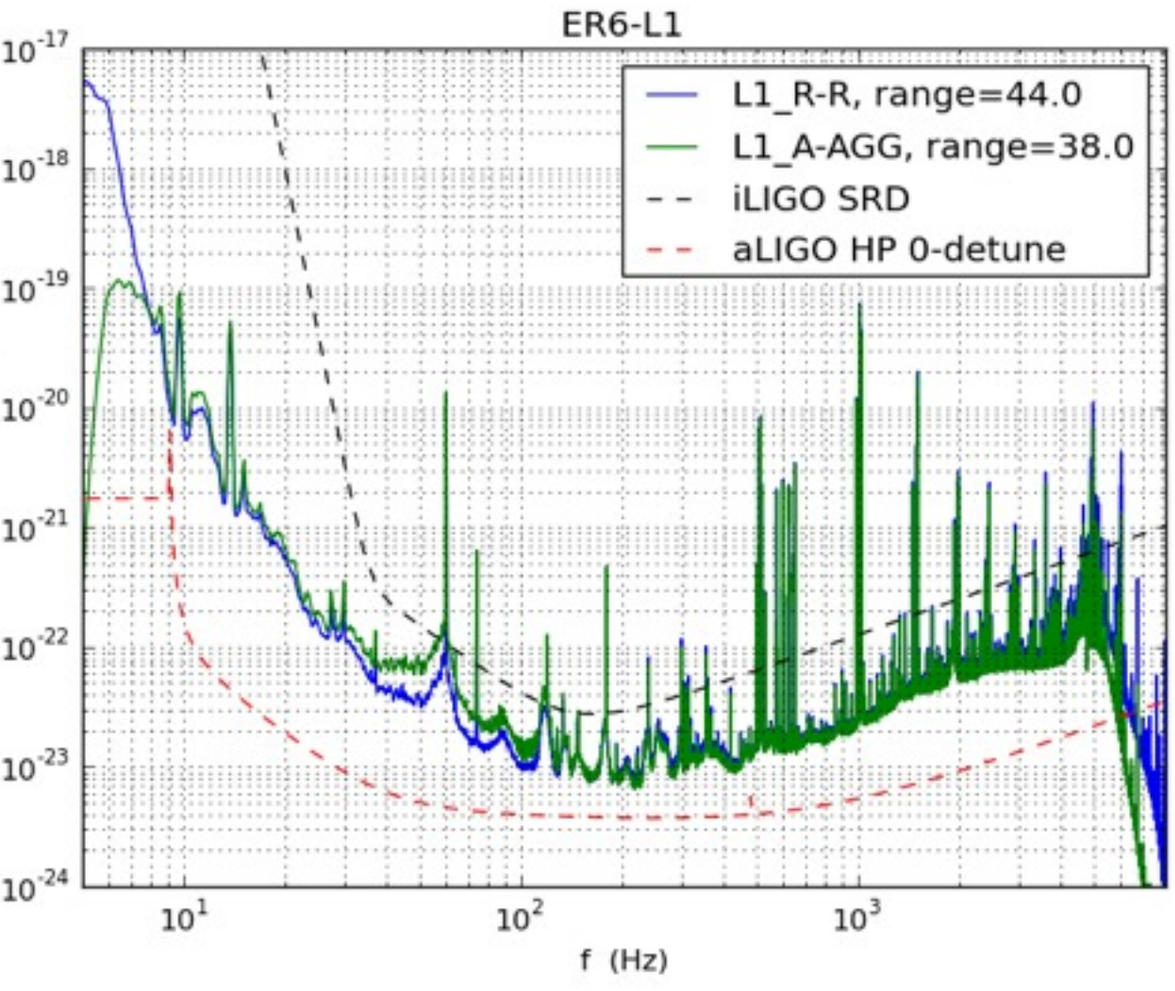
alog 16270 reported a significant discrepancy between the two, especially at intermediate frequencies. The improved filters produce much better agreement; see first figure attached.

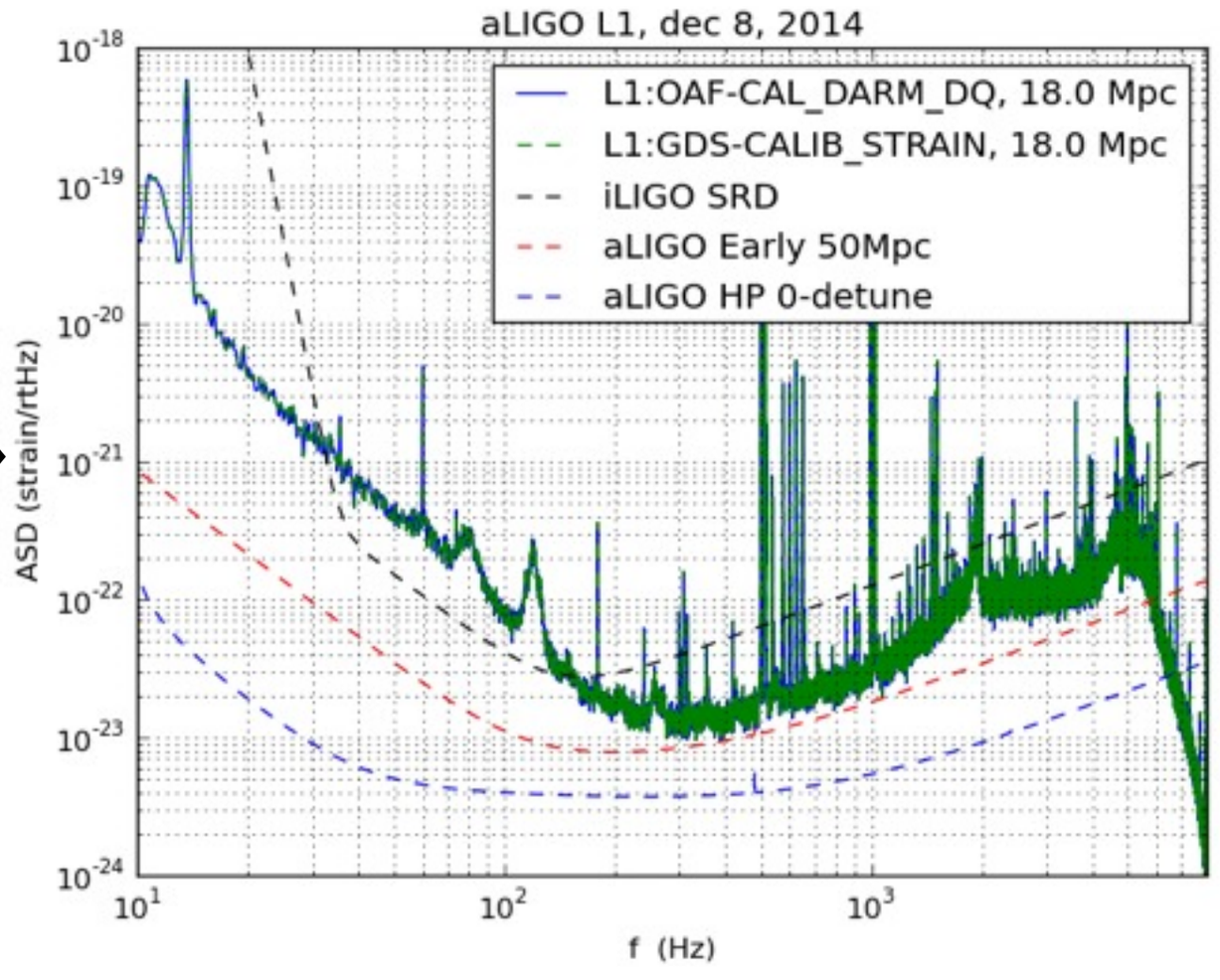
This will get propagated to the online code, soon. For now, there is still disagreement; for example, here's the comparison from the Feb 1 lock stretch: second figure attached.

Also in the plan is to automate the capturing of any changes to the front-end filtering that are relevant for calibration, to regenerate the filters to be used by gstlal_compute_strain to produce L1:GDS-CALIB_STRAIN.

https://alog.ligo-la.caltech.edu/aLOG/index.php?callRep=16680

L1:OAF-CAL_DARM_DQとL1:GDS-CALIB_STRAINのASD(Amplitude Spectrum Density?)比較 improved filterのおかげで合うようになった。





L1 General (CAL, General) Link

shivaraj.kandhasamy@LIGO.ORG - posted 11:07, Tuesday 03 February 2015 - last comment - 16:58, Wednesday 04 February 2015(16643)

sensitivity intergrand plot

Shivaraj and Duncan M

On the front wall of LLO, in addition to the BNS range time series plot we have added a time-frequency plot that gives frequency-wise contribution to BNS range (at SNR = 8 for 1.4 Msun masses). It is the the integrand of BNS range function normalized such that at each frequency it is an estimate of BNS range by that frequency alone. The plot updates in real time with user defined parameters. It is a python code based on GWPy package (used for summary pages, written by Duncan Macleod). It is available at /usr/local/home/kiosk/rangemonitor/. The command to run to make the plot is 'gwdv -t range.ini' (the required softwares are already installed). The 'range.ini' file contains relevant parameters for the plot. Following are some of the parameters user might want to tweak,

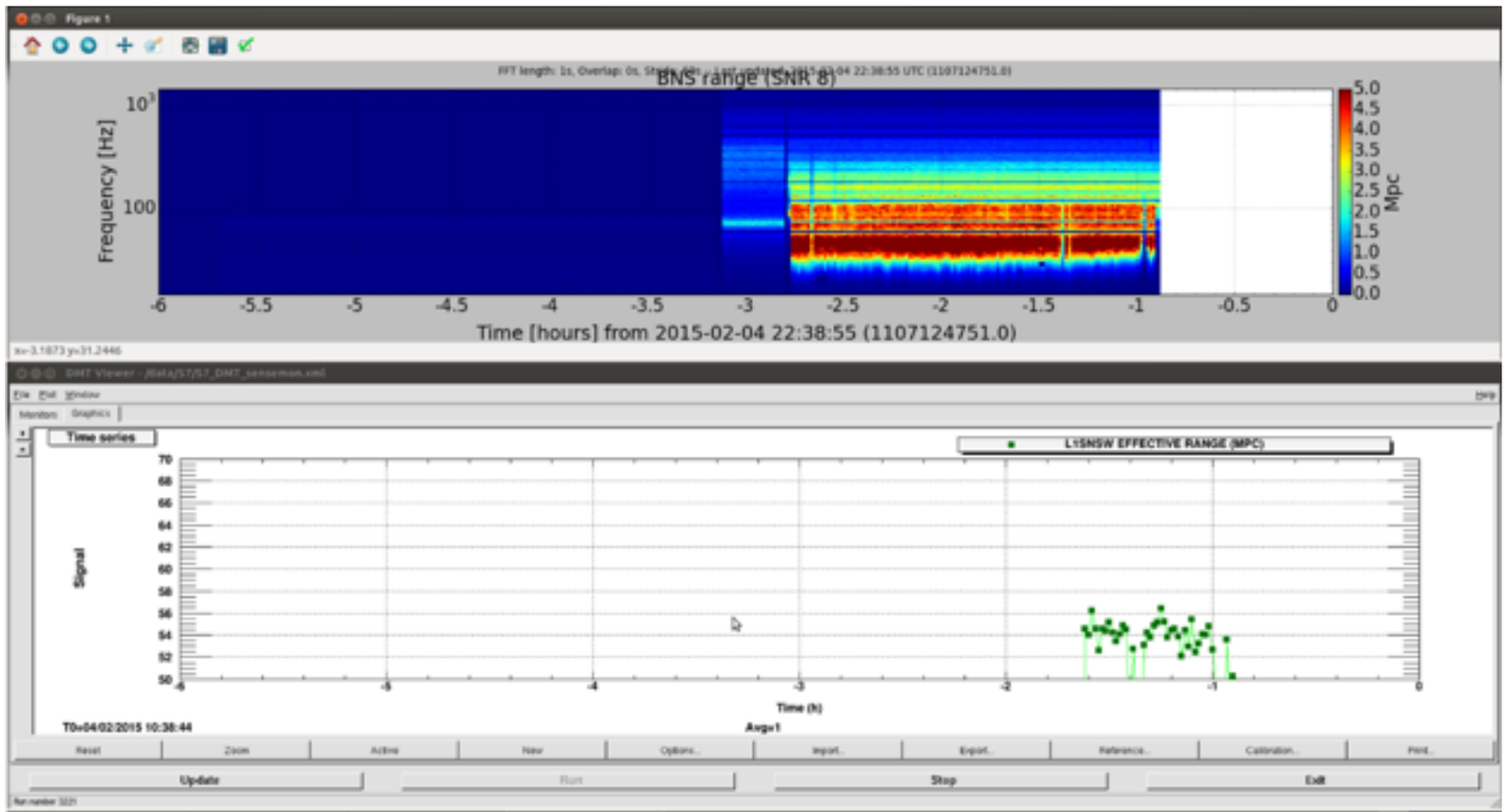
duration - total time span of the plot (in sec); currently set to 6 hrs

stride - length of each column (in sec); currently set to 60 sec to agree with DMT time series plot
fftlength - length of fft (in sec); currently set to 1 sec; final spectrum is an average of ffts in each stride
overlap - overlap of ffts in each stride (in sec); currently set to 0

It uses a dewhitening filter to get calbrated strain from L1:OAF-CAL_DARM (also defined in the file). There are a few other parameters in the file that control colorbar and Y-scale of the plot. Currently it is set to look for 'L1:GRD-IFO_LOCK_OK' to produce each time-frequncy stride (otherwise it display a blank space). It is a test script at this point, so if anyone has suggestions please let us know. I will add some plots later.

https://alog.ligo-la.caltech.edu/aLOG/index.php?callRep=16643

LLO fron wallにTF planeをのせたBNS rangeの時間プロットを足した。



L1 ISC Link

denis.martynov@LIGO.ORG - posted 03:32, Saturday 07 February 2015 - last comment - 17:02, Saturday 07 February 2015(16722)

ETMY noise investigations

Valera, Adam, Anamaria, Den

Today we decided to measure potential fluctuations arount ETMY to estimate noise coupling to DARM through the charge. We made an estimation by floating TCS ring heaters and measuring voltage between each other and one heater and a ground. First measurement has shown broadband noise of ~20nV/Hz$^{1/2}$ at frequencies higher than 100Hz and increasing up ~100nV/Hz$^{1/2}$ at 20Hz. Broadband noise of ring heater relative to the ground is 1uV/Hz$^{1/2}$ and 60Hz line amplitude is 700uV.

From this measurement we have concluded that ground potential broadband noise level is 1uV/Hz$^{1/2}$. We have assumed that if we leave ESD blades floated, we can reduce differential noise down to tens nV/Hz$^{1/2}$ simular to two ring heaters.

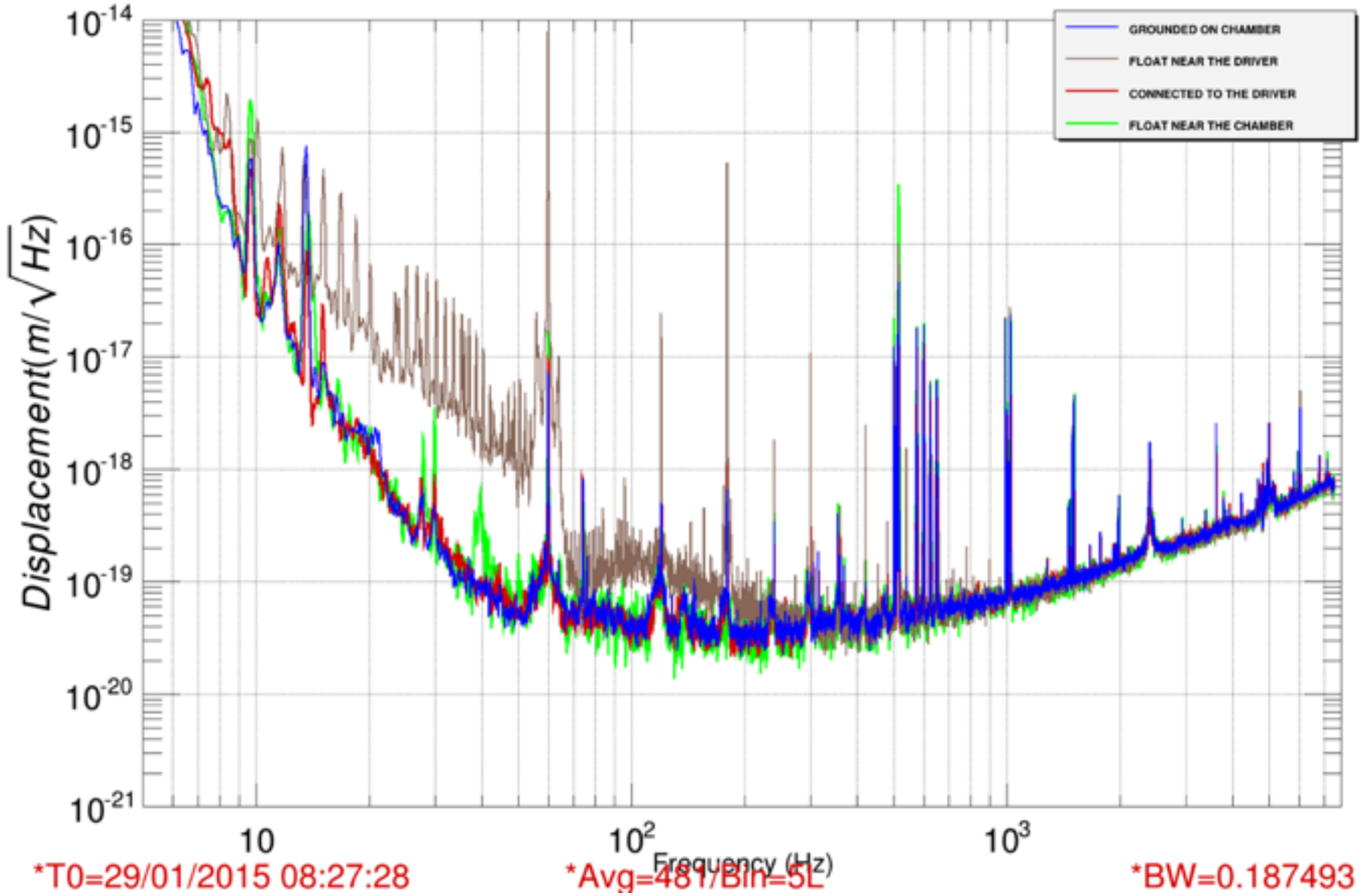
First we have turned off ETMY ESD driver, shut down HV power supply and disconnected cables from the driver to make ESD blade potential float. We started to see a big 60Hz line in DARM spectrum (grey line on attached plot). This was quiet surprising for us and we decided to disconnect the cables after the resistor box on top of the chamber. Then 60Hz line became of usual size but we started to see an acoustic bump around 40Hz (green line). Then we have terminated all ESD cables near the chamber input and got slighly better DARM noise (blue line vs usual red line). First of all power lines imporved by almost factor of 2. Also broadband noise in the frequency range 30-50Hz got better by ~20%. We think this is due to lower potential noise on ESD blades. At the same time noise from other metal sources did not change and 74Hz line from ring heater stayed on the same level.

At this moment it is not clear to us why floating ESD blades by disconnecting HV cables from the driver increased 60Hz line in DARM spectrum by ~1000. We suspect we need to think more about the shielding.

We have ETMX ESD working again and assigned ETMY charge disctribution measurement using length and angular servos for this weekend.

https://alog.ligo-la.caltech.edu/aLOG/index.php?callRep=16722

詳細はfollowしきれていないですが、ETMYとDARMのnoise couplingに関して詳細に調べた。
前述のring heaterなど
ESD:Electro Static Drive
何かをON/OFFしてチェック



L1 CDS (CDS) Link

keith.thorne@LIGO.ORG - posted 09:31, Wednesday 11 February 2015 (16768)

Update conlog channel list, remove unstable channels

I did the regular maintenance on the conlog
(top level directory is /ligo/cds/llo/l1/conlog)
1) I updated the channel removal list (data/remove_channel_names_2015-02-10) based on Nagios updates on unstable settings. I loaded this into the conlog system.
2) For each of the new channels in the removal list, I removal all update rows in the conlog MySQL database
3) I generated a new channel list (data/use_channel_names_2015-02-11) using script (scripts/scan_autoburt.sh). This has now been loaded into conlog

* Some time the current remove_channel_names list need to be compared to the use_channel_names list to remove no-longer-existent channels

channels removed from conlog

L1:SUS-BS_M2_EUL2OSEM_1_1
L1:SUS-BS_M2_EUL2OSEM_1_2
L1:SUS-BS_M2_EUL2OSEM_1_3
L1:SUS-BS_M2_EUL2OSEM_2_1
L1:SUS-BS_M2_EUL2OSEM_2_2
L1:SUS-BS_M2_EUL2OSEM_2_3
L1:SUS-BS_M2_EUL2OSEM_3_1
L1:SUS-BS_M2_EUL2OSEM_3_2
L1:SUS-BS_M2_EUL2OSEM_3_3
L1:SUS-BS_M2_EUL2OSEM_4_1
L1:SUS-BS_M2_EUL2OSEM_4_2
L1:SUS-BS_M2_EUL2OSEM_4_3
L1:ISI-HAM2_WD_ACT_THRESH_MAX
L1:ISI-HAM3_WD_ACT_THRESH_MAX
L1:ISI-HAM4_WD_ACT_THRESH_MAX
L1:ISI-HAM5_WD_ACT_THRESH_MAX
L1:ISI-HAM6_WD_ACT_THRESH_MAX
L1:ISI-ITMX_ST1_WD_ACT_THRESH_MAX
L1:ISI-ITMY_ST1_WD_ACT_THRESH_MAX
L1:ISI-ETMX_ST1_WD_ACT_THRESH_MAX
L1:ISI-ETMY_ST1_WD_ACT_THRESH_MAX
L1:SUS-ETMX_R0_OPTICALIGN_P_OFFSET
L1:SUS-ETMX_R0_OPTICALIGN_Y_OFFSET
L1:SUS-ETMY_R0_OPTICALIGN_P_OFFSET
L1:SUS-ETMY_R0_OPTICALIGN_Y_OFFSET

conlogが分からないのですが、いくつかのチャンネルを外したそうです。

https://alog.ligo-la.caltech.edu/aLOG/index.php?callRep=16768

L1 SUS Link

nicolas.smith@LIGO.ORG - posted 16:14, Monday 09 February 2015 - last comment - 14:19, Friday 13 February 2015(16740)

Q factor and resonance frequencies of UIM blade springs.

(anamaria nic)

Based on the measurements reported in an earlier log, here are the results of the uim blade spring Q measurements:

Results for ETMY
resonance frequencies: 111.60Hz, 111.74Hz.
Q = **40038.7819** (38402.5636, 41820.634)

Results for ETMX
resonance frequencies: 111.84Hz, 111.14Hz.
Q = **51482.8205** (49021.2116, 54204.7202)

Results for ITMY
resonance frequencies: 112.38Hz, 111.83Hz.
Q = **30022.3135** (29517.4432, 30544.7551)

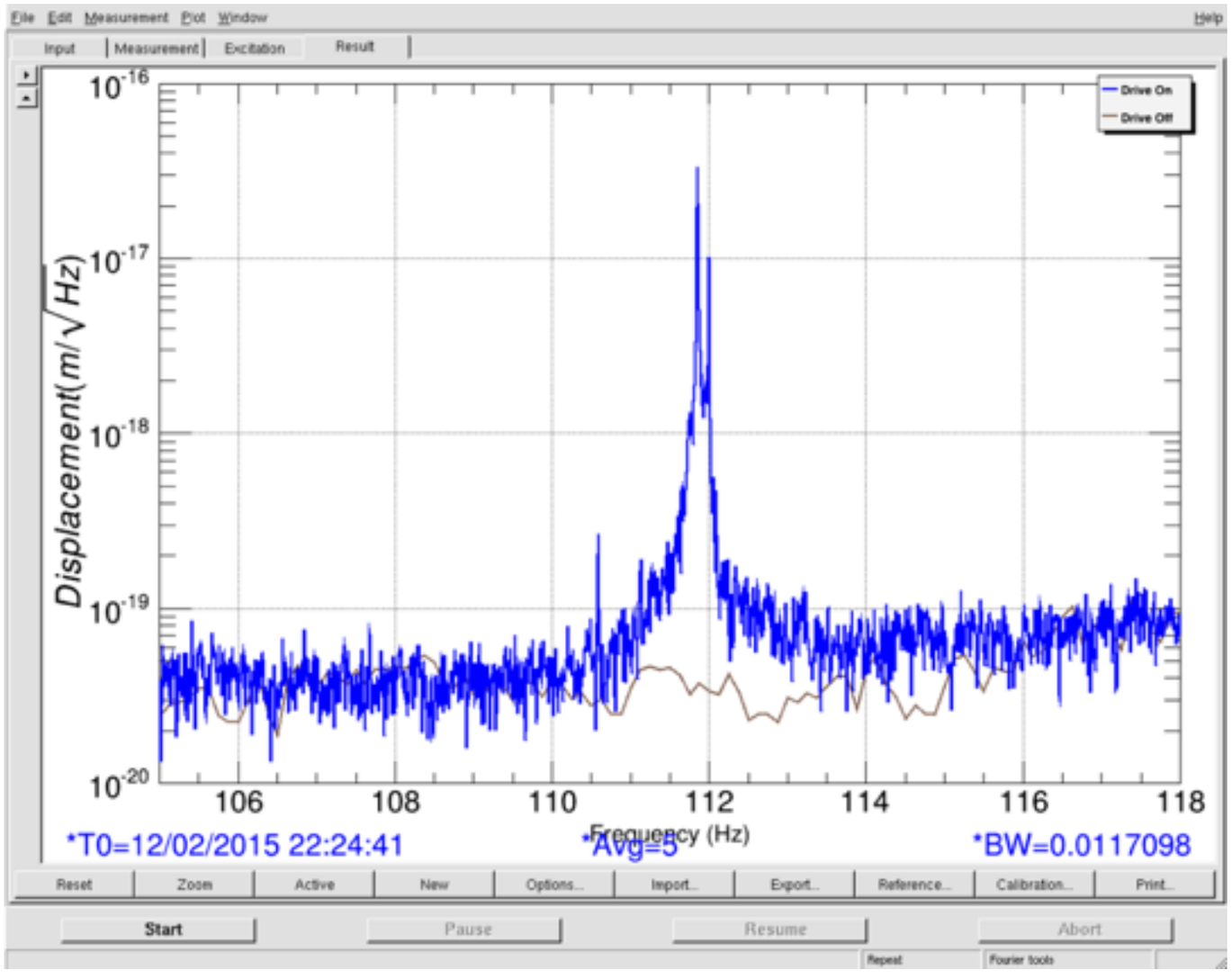
The ITMX data was bad, not enough SNR. It will have to be repeated. Though one of the blades clearly is resonant at 111.85Hz

The frequencies were measured with bandwidth of ~0.01Hz, the Q values in parentheses are the confidence interval of the fit. Each UIM has two blades, and their measured resonances are given above, but I'm only reporting a single Q. The modes were beating together and I am looking at the overall envelope. So it probably represents the max of the two.

https://alog.ligo-la.caltech.edu/aLOG/index.php?callRep=16740

テストマスのQ値を測定し
ました。

Results for ITMX
resonance frequencies: 111.85Hz, 112Hz.
Q = **42077.1649** (41113.6222, 43086.9547)



L1 General (Detchar) Link

adam.mullavey@LIGO.ORG - posted 19:09, Friday 13 February 2015 (16807)

SenseMon can now run in multiple Guardian states.

John Zweizig has changed the definition of the 'lock state' for DMT SenseMon_CAL_L1 so that we can include multiple guardian states. The SenseMon will now run when L1:GRD-IFO_LOCK_STATE_N > 999.

Therefore to have the SenseMon run for a particular state, we just need to set its index to a number >= 1000. So far this has been done for two states - DC_READOUT and LOW_NOISE.

https://alog.ligo-la.caltech.edu/aLOG/index.php?callRep=16807

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Therefore to have the SenseMon run for a particular state, we just need to set its index to a number >= 1000. So far this has been done for two states - DC_READOUT and LOW_NOISE.

https://alog.ligo-la.caltech.edu/aLOG/index.php?callRep=16984

calibrationに関するreport